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WEEKLY SURVEYOR

USSR AND EASTERN EUROPE

Two Soviet scientists are researching the relationship between evoked cortical potentials (ECP) and unconscious responses to emotional words. They imply that the object of the work is to examine neurophysiological mechanisms of perceptual defense. It is believed that they also may be interested in the use of ECP in a lie detection role.

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[redacted]

A. G. Presnyakov, a Soviet inventor, has constructed a solar engine which directly converts solar thermal energy into mechanical motion. Such a device would be useful for generating small amounts of power from solar energy in areas not having the benefit of advanced technology; it is noncompetitive when large amounts of power are required. [redacted]

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Oleg V. Bogdankevich of the Institute of Physics imeni Lebedev, Moscow, states that electron beam pumped semiconductor lasers (EBPSL) have significant potential application in laser address switching for computers. The use of EBPSLs for address switching is potentially the best solution to random access switching to individual holograms in a computer memory. Holographic memories offer the potential of much higher storage capacity with rapid access than current computer memories. [redacted]

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[redacted]

The second reactor has been started up at the Soviet Bilibino Nuclear Power Station. This is the first nuclear power station in the Soviet Far East. [redacted]

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CHINA

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PRC higher education is reported to be in a shambles. Mao's revolutionary educational policies have failed to provide the quantity and quality of graduates needed to develop and assimilate advanced technology. PRC education officials apparently are aware of the problems but are unable or unwilling to take bold steps to correct them as long as Mao's policies prevail. [redacted]

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The Chinese have successfully completed a deep water oil exploration well in the southern Yellow Sea. The well was drilled by the first native-designed and built drillship, the "Kan-tan No. 1." This represents an advance in China's offshore exploration, and the new drillship could significantly upgrade Chinese drilling capability in deep water. This is the first confirmed offshore well drilled outside the Po-hai Gulf. [redacted]

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NUCLEAR ENERGY

Soviets Announce Startup of Second Reactor at the Bilibino Nuclear Power Station (AES): The second power set at the Bilibino AES has been turned over for operation ahead of schedule. The station's capacity is now 24 megawatts electric (MWe). [redacted] 25X1

Comment: The Bilibino AES is the first nuclear power station in the Soviet Far East. When complete, this station will have an electric generating capacity of 48 MWe, provided by four water-cooled, graphite-moderated, pressure-tube reactors. 25X1 [redacted] The power from the Bilibino AES will be used to further the economic development of the Chukotka Peninsula. In addition, the waste heat will be used to supply hot water to Bilibino and to warm hot-houses for the year round production of fresh fruit and vegetables. [redacted] 25X1

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BEHAVIORAL SCIENCES

Soviet Research on Evoked Cortical Potentials Possibly Used in Lie Detection: Two Soviet scientists at the Serbskiy Institute in Moscow have been researching the relationship between evoked cortical potentials (ECP) and unconscious responses to emotional words. In this research, neutral and emotional words were presented on a tachistoscope to 14 subjects described as psychopathic personalities. The duration of exposure of the verbal stimuli on an electroluminescent screen was 15 ms. Although each of the subjects reported an inability to perceive the words, evoked cortical potentials were recorded for both the neutral and emotional words. Later in the experiment, the subjects also were presented the same words visually and slowly, and evoked potentials were compared for both conditions. Analysis of the ECP in the subliminal case showed a difference in amplitude of the late positive component in the occipital region for neutral and emotional words with the amplitude for the emotional stimuli clearly greater. When the ECP's late, negative component of the conscious stimuli was analyzed, it did not change significantly in either form or magnitude upon presentation of emotional or verbal stimuli. When the subjects did not perceive the word, the negative component for emotional stimuli was clearly of greater amplitude in both the occipital region and in the vertex. The authors also reported that amizil (a drug similar to meprobamate) eliminated the differences in evoked cortical potentials to neutral and emotional words and leveled the threshhold of their perception. [redacted]

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Comment: Although the authors imply that the object of their research is to examine neurophysiological mechanisms of perceptual defense, it is possible that these researchers are actually working on a form of lie detection. Soviet interest in evoked cortical potentials as a possible polygraph technique appears to have existed since 1968. If this technique is applied in lie detection, the subject would be unaware of his response to an emotional provoking stimuli. Use of the evoked cortical potentials in this fashion requires application of computerized techniques for smoothing the electrical output from the cortex which is well within the current capabilities of Soviet computer science.

The reported use of the drug amizil indicates that the authors also may be interested in determining ways in which the use of the evoked cortical potentials in a lie detection role could be neutralized. The research reported by the authors appears to be carefully designed, well controlled, and displays

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a level of sophistication nearly equivalent to that of US research on evoked cortical potentials. This research is conducted at Serbskiy Institute which houses political dissidents and the criminally insane. [redacted] [redacted]

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SCIENTIFIC AND TECHNICAL RESOURCES

PRC Higher Education Reported To Be in a Shambles: Higher education in the PRC is reported to be in a shambles. Most programs have been shortened to 3½ years and enrollments are well below previous levels. Formal graduate training has not been reestablished except for a few experimental classes in electronics. Officials admit that they are not meeting the country's need for engineers. Factories are attempting to fill the gap by providing on-the-job training for engineers. [redacted]

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Comment: Mao's revolutionary educational policies have failed to provide the quantity and quality of graduates needed to develop and assimilate advanced technology. Difficulties reported earlier include poor selection procedures for qualified students and the need for extensive remedial training for students after they have worked 2 to 3 years on the farms and in factories.

The on-the-job training programs given by factories and some research institutes are believed to be widespread and useful in training technicians. This informal training is believed to be fairly low in quality, however, and probably is insufficient to meet China's needs in advanced technology. PRC education officials apparently are acutely aware of their educational problems but are unable or unwilling to take bold steps to correct them as long as Mao's policies prevail. [redacted]

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PHYSICAL SCIENCES AND TECHNOLOGIES

Soviet Inventor Constructs Solar Engine: Moscow inventor, A. G. Presnyakov, has constructed a solar "engine" which directly converts solar thermal energy into mechanical motion. Presnyakov's invention recently won a prize at an All-Union Competition for Solar-Powered Water Pumps sponsored by the All-Union Council of Scientific-Technical Societies and the USSR Ministries of Agriculture and Land Reclamation. [redacted]

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Comment: Performance data are unavailable on Presnyakov's device, but [redacted] [redacted] device appears to consist of a vertically mounted wheel which receives heat on one portion; the heat causes expansion of that portion which generates an imbalance of forces and thus yields rotary motion.

The concept of a heat engine using a solid working substance (such as rubber or solid metal), rather than a conventional gaseous working substance, has been studied in the US. However, the solid thermal engine has a very low thermal efficiency. Working models generating power levels of only one watt have been constructed. NASA researchers have concluded that the solid thermal engine cannot be considered unless the cost of the fuel is negligible and simplicity is the most important design consideration. A solid thermal engine would thus be useful for generating small amounts of power from solar energy in areas not having the benefit of advanced technology--precisely the intended application of Presnyakov's invention. Because of the low thermal efficiency of the solid thermal engine, even using free solar energy as an input, it is noncompetitive when large amounts of power are required. [redacted]

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Soviet Electron Beam Pumped Semiconductor Lasers (EBPSL) Promising for Holographic Memory Switching: In a recent review article on EBPSLs, Oleg V. Bogdankevich of the Institute of Physics imeni Lebedev, Moscow, states that EBPSLs have significant, potential applications in laser address switching for computers as well as applications such as large-screen TV projection and information displays. Specifically, he claims that EBPSLs offer an order of magnitude faster switching than that of laser beam deflectors. Switching speeds equal to those of EBPSLs can be achieved with arrays of semiconductor injection lasers (laser diodes) but the diodes are difficult to fabricate,

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and it is difficult to select the required diode from an array. [redacted] [redacted] 25X1

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Comment: The use of EBPSLs for address switching is potentially the best solution to random access switching to individual holograms in a computer memory. It offers increased speed, but more importantly, it offers precise control of the laser beam position and eliminates bulky and troublesome mechanical and electro-optical beam deflectors. The USSR has conducted more extensive research on holographic memories than any other country. Holographic memories offer the potential of much higher storage capacity with rapid access than current computer memories. Difficulties in random access switching, rapid writing, and readout have outweighed the advantages of such memories, and the high cost of development and assembly have not been justified. Bodgankevich's EBPSL appears to be the solution to the first of these difficulties. [redacted] [redacted] 25X1

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China Announces First Offshore Drilling by New Drillship: The Chinese press has touted the successful completion of a deep-water oil exploration well in the southern Yellow Sea. The well was drilled by the first native-designed and -built drillship, the twin-hulled (catamaran) "Kan-tan (prospector) No. 1." All operations from initial positioning and installment of sea floor equipment through well logging were accomplished without equipment failure or position maintenance difficulties. [redacted] 25X1

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Comment: This successful test is an advance in China's offshore exploration and the new catamaran could significantly upgrade Chinese drilling capability in deep water. This is the first confirmed offshore well drilled outside the Po-hai Gulf.

The Chinese have used fixed platforms and at least three jack-up type floating platforms (including one purchased from Japan) with limited water depth capabilities in the Gulf over the past several years. They also have attempted to acquire semisubmersible drilling platforms for water depths of up to 600 feet or more, but these attempts apparently have failed for the present. The new catamaran, while not as flexible or sophisticated as a semisubmersible platform, would allow the investigation of potential oil deposits located by geophysical surveys over wide areas of China's continental shelf.

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More than one such ship is needed for an accelerated deep-water exploratory program. Two Chinese catamarans reportedly were designed as early as 1964 [redacted] The anchoring capability of the *Kan-tan* is unknown, but it may be able to operate in water depths over much of China's continental shelf. The ship is very similar to the US drillship, the E. W. Thornton, which has operated for several years in the South China Sea and is currently working in the Andaman Sea. [redacted]

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